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# COVID-19 STATEMENT

NASA has been closely monitoring developments of the COVID-19 outbreak. We are aware that many of the student teams participating in the Artemis Student Challenges must cope with limited or suspended physical access to campuses, travel restrictions or other impediments that may affect their ability to participate in the challenges as proposed. Due to these hurdles we continue to face, and out of an abundance of caution for the teams and our workforce, activities for each of these events may look different than originally planned. It should be noted that the technical work completed by each team will not go unnoticed. Challenge managers for each activity will be in contact with participants on specifics and changes to the challenges, if any. We will continue to monitor the situation and remain flexible and adapt as it evolves. NASA is an agency of the Federal Government and will adhere to all directives issued. Thank you for your patience and understanding.

*Be aware that all dates and events are subject to change and / or cancellation.*

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**FAQ's – Rev 07 – 11.19.2021**

39Q: I am asking a clarifying question for section 7.2, category 4: Camera bandwidth Use. Is the situational awareness camera referenced here the same camera as the "Lander" camera referenced in Section 7.4 Item 3? Are we permitted to use a camera for our robot's autonomy and not lose these bandwidth points?
**39 A: No. Both terms refer to the same camera. We will correct all terms to read as "Lander Camera."**

38Q: If the sieve can slide in and out over the BP-1 surface, what prevents it from sliding backwards when a rover pushes against it while docking?
**38A: The sieve is a fixed object.**

37Q: We were wondering if the rover can attach itself to the collection bin when depositing the regolith.
**37A: No. The rover shall NOT be attached to the collection bin. This is not a current off-world protocol that is being considered.**

36Q: In the rulebook, it mentions that we will be security checked every time that we are entering the KSC. If we plan on bringing tools or anything else for our rover, what is allowed and what isn't?
**36A: Use sound engineering practices and principles as to what you bring to the competition. If there is an issue at Check-In, then a discussion will have to happen with NASA Security.**

35Q: Is there a hotel that the competition recommends/hotel where all the competitors will stay at? If so, which hotel and are any discounts provided?
**35A: We do not provide information on this subject.**

34Q: Can you go further into depth what the rulebook means by "Teams may use honeycomb structures as long as they are strong enough to be safe and the edges sealed to prevent dust intrusion." (Bullet 5 in 8.1 Robot Requirements section) I have provided a photo of the UNL Lunabotics flexible wheel. Do these wheels meet this criteria? Are holes through the wheel acceptable? What are acceptable sealed edges?
**34A: We do not comment on "meeting" a design criteria. It is the teams' responsibility to meet the criteria in the Guidebook. A wheel with a large honeycomb structure that is open on both sides is allowed as long as the edges are not so sharp that they would be a cutting hazard.**

33Q: If they meet the rulebook criteria, are flexible wheels allowed in the competition?
**33A: Yes.**

32Q: Are we allowed to use touch sensor on sieve to align?
**32A: No. Touch sensors are not allowed on the robot.**

31Q: Can you confirm if our faculty advisor needs to attend the competition in May?
**31A: Faculty Advisor - The faculty advisor shall be 21 years old at faculty registration, must be currently registered with the institution, in good standing and authorized to represent their institution. The faculty advisor shall attend the on-site competition with the team.**

30Q: If we have a main robot system and a secondary support system that is stationary do we need a electric data logger for each system? The secondary system would be attached to the collection bin and considered a 'lander subsystem', probably drawing around 250mA at 5V.
**30A: DATA LOGGER - Yes. You need a data logger for every device. The spirit and intent (and requirement) is to record the total energy usage by the mining system. SECONDARY SUPPORT SYSTEM – Shall NOT be attached to the collection bin.**

29Q: Do you know if there will be a limit to the number of people a team can bring to the competition? Otherwise, is this a possibility of happening with covid (Covid-19) restrictions?
**29A: The number of students that can come to the on-site competition is at the discretion of the Faculty Advisor. At the present time, LUNABOTICS is NOT authorized to have an on-site competition. Teams will be notified of any changes.**

28Q: What are some best practices in practicing for the event? One example is the best material to use as lunar regolith simulant (some suggested powdered limestone but that has safety issues).
**28A: We do not provide information on this subject. It is the teams' responsibility to make this determination.**

27Q: Do outreach events have to be virtual?
**27A: It is the teams' responsibility to make this determination. Teams must follow all local, state and Federal (CDC) Covid-19 guidelines.**

26Q: What are we allowed to place on the shelf provided in the arena?
**26A: The shelf is where teams will place their Wireless Access Point (WAP) to communicate with their robot.**

25Q: If we choose to bring our own webcam to the arena, where can we place it?
**25A: Not too specific, so we will go with "you cannot bring your own webcam into the arena."**

24Q: Would like clarification if we can do one event, invite 3 different age groups, and do 3 different activities. Or if needs to be 3 separate activities delivered at different times.
**24A: Not too specific, if this is referring to the Public Outreach Report, then "It is the teams' responsibility to make this determination."**

23Q: I would be interested to know who won in the past and the design of their robots.
**23A: You can see past competition robots by searching for NASA Robotic Mining Competition / RMC: Lunabotics / Lunabotics on YouTube. You can see a list of past competition winners at https://www.nasa.gov/content/lunabotics-information**

22Q: 7.3.3 – Is there a difference between the lander cam (mentioned in 7.4.3) and the situational cameras?
**22A: No. Both terms refer to the same camera. We will correct all terms to read as "Lander Camera."**

21Q: Are Public Outreach events required to be with a school?
**21 A: No. You can engage organizations such as (but not limited to): Boys Club, Girls Club, Little League teams, Pony Ball teams, Scouts (Belt Loop/Merit Badges), First Lego League, Odyssey of the Mind, Students with Special Needs … etc. You may want to go online and see what opportunities are in your K-12 community and remember to follow the rubrics!**

20Q: Section 6.3 states: "The report must reflect how the team inspired others virtually to learn about robotics and engineering" and "Develop three quality activities for K-12 classrooms to participate in your virtual STEM experience." However, section 6.3 also states "The report must contain a table for both virtual and in person events that includes each event, age/grade level, and number reached." Are the outreach events that we create and host intended to be in person or virtual?
**20A: It is the teams' responsibility to make this determination. Teams must follow all local, state and Federal (CDC) Covid-19 guidelines.**

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**FAQ's – Rev 06 - 10.08.2021**

19Q: With regards to FAQ #9, are non-US citizens who have green cards or permanent resident status allowed to physically go to the competition in May at KSC?
**19A: At the present time, no. This is a new security issue that is currently under review. Any changes on this will be published here, in the FAQ's. However, anyone can go to the Kennedy Space Center Visitor Complex and view the event as a spectator (https://www.kennedyspacecenter.com/).**

18Q: Reference Guidebook Section 8.5.3 Autonomous Operation Protocol:
"The walls of the mining arena shall not be used for sensing by the robot to achieve autonomy. The team must explain to the inspection judges how their autonomous systems work and prove that the autonomy sensors do not use the walls. There are no walls on off world locations and teams shall operate as closely as possible on that scenario of operations. Integrity is expected of all team members and their faculty advisors." Can we use the walls as an "object" in our program such that our robot can avoid it in order to keep the robot from ramming into the wall? Our purpose is not to detect the wall and go around the full pit to finish an autonomy cycle. It is to simply keep the robot from excessively hitting the walls during autonomy and focus more on traversing the pit.
**18A: You may use the walls as an "object" in your program such that your robot can avoid it in order to keep the robot from ramming into the wall. The intent of the rule is to avoid touch sensors from being deployed. The perception system data associated with the walls shall be used for object detection purposes only. The same perception data shall not be used for localization.**

17Q: Rule "VIII. REQUIREMENTS 8.1.5" states, "Teams may use honeycomb structures as long as they are strong enough to be safe and the edges sealed to prevent dust intrusion". If the honeycomb structure is open on both sides and can easily be blown out would that be allowed (such as a wheel with a large honeycomb structure that is open on both sides)?

**17A: A wheel with a large honeycomb structure that is open on both sides is allowed as long as the edges are not so sharp that they would be a cutting hazard.**

16Q: When returning any material that is mined, there is a grate for any dust collected to fall through. What size are the gaps that would be in this grate?
**16A: The grate is a wire mesh, the openings measure ½" x ½".**

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**FAQ's – Rev 05 - 09.30.2021**

15Q: Our team was trying to put together a good score to shoot for. But I cannot find the (mining kilograms) points from past competitions.
**15A: Here are the top 5 mining results from the last time we had an on-site mining competition in 2018:**

| RMC: Lunabotics 2018 - Mining | | |
|---|---|---|
| Rank | | Total Gravel (Icy Regolith Simulant) KG |
| 1 | | 5.69 |
| 2 | | 4.98 |
| 3 | | 4.27 |
| 4 | | 2.00 |
| 5 | | 0.75 |

14Q: In past years, the launch volume dimensions of the robot could be oriented in any way (i.e. length, width, height could be defined to be along any of the X, Y, Z axes). Is this still the case for this year's competition?
**14A: The Guidebook is silent on this issue. But to answer your question, yes it is.**

13Q: With regard to the Project Management Plan, would a title / cover page count towards the 5-page limit?
**13A: A cover page is not required, though include your University name on the PMP. If you do include a cover page, it will not count towards the page limit.**

12Q: We would like to inquire about the requirements for the kill switch on the robot. In the handbook, it describes using an "unmodified" standard button. Our team would like to make an aesthetic plastic cap to place on top of the button, without removing or changing the functionality of the standard button in any way. Would this be a violation of what was meant by "unmodified" even though it does not change functionality or structure and can be easily removed?
**12A: The "Kill Switch" shall meet the requirements in the Guidebook.**

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**FAQ's – Rev 04 - 09.24.2021**

11Q: I have a question about "full-time student" status and what defines full time students per the guidebook? I could not find any specific number of credit hours. We have few students who are very dedicated and interested in participating but are not enrolled in 12+

credits this semester. They are active members of our Robotics club and will be here until Summer 2022. Will they be able to participate?

**11A: Great question! Under the school of thought that we are to look out for each other in these uncertain and interesting times, let's do the following: It up to the school to determine what is a full-time student. It is up to the Faculty Advisor to decide if they want to allow part-time students to participate.**

**Based on FAQ 11, Guidebook 2022, Section 3.2.1.b. is revised to read as follow:**
The team will be compromised of enrolled ~~**full-time**~~ undergraduate and graduate students. The team must include at least two undergraduate students.

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**FAQ's – Rev 03 - 09.21.2021**

10Q: What are the COVID-19 restrictions in place?
**10A: This is an evolving situation. At the present time, LUNABOTICS is NOT authorized to have an on-site competition. Any changes on this will be published here, in the FAQ's. LUNABOTICS is having a Virtual competition and we are working on and planning to have an on-site competition. The current policies are listed below.**

**VISITORS**

Visitors to NASA facilities still are required to complete a Certification of Vaccination and, beginning Sept. 20, 2021 provide time-stamped proof of a negative COVID-19 test taken within the previous three days.

**GUIDE TO FACE COVERINGS/MASKS SEPTEMBER 2021 (CORRECTED COPY)**

As a result of several inquiries to both the center director and Kennedy's medical team regarding face coverings, we're providing the following information.

**On Aug. 13, 2021** the Centers for Disease Control and Prevention (CDC) updated their guidelines regarding the wear of face coverings or masks called Your Guide to Masks. The guide has information on how to select a mask, special considerations for masking with gaiters and face shields, correctly masking for children and people with beards, and how to correctly wear, remove, clean, and store face coverings.

Regardless of vaccination status, on all federal properties, including Kennedy Space Center, a proper face covering shall be worn over the nose and mouth while indoors (except while eating or drinking where social distancing must be maintained or you are in an office with floor-to-ceiling walls and a closed door) or while outdoors when social distancing cannot be maintained.

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9Q: Can non-U.S. citizens physically go to the competition at KSC in May? (Reference: not found).
**9A: At the present time, no. This is a new security issue that is currently under review. Any changes on this will be published here, in the FAQ's. However, anyone can go to the Kennedy Space Center Visitor Complex and view the event as a spectator ( https://www.kennedyspacecenter.com/ ).**

8Q: 8.4.6 – What is meant by this section? Are we supposed to fill in the blank ourselves?
**8A: 8.4.6 is deleted from the Guidebook.**

7Q: Our team is requesting clarification on whether the mass limit is 60kg or 80kg.
**7A: Section 8.1.1.b is correct as written. The mass limit is 80kg. Section 8.3.4. is changed to read as follows: Each team is responsible for placement and removal of their mining**

**robot onto the BP-1 surface. There must be one person per 20 kg of mass of the mining robot, requiring a minimum of three people to carry the maximum allowed mass of 80 kg. Assistance will be provided if needed.**

6Q: We would also like to know what collision detection sensors are allowed in the competition.
**6A: The Guidebook is silent on this issue. This is at the discretion of the Team, as long as they comply with the rules and rubrics in the Guidebook.**

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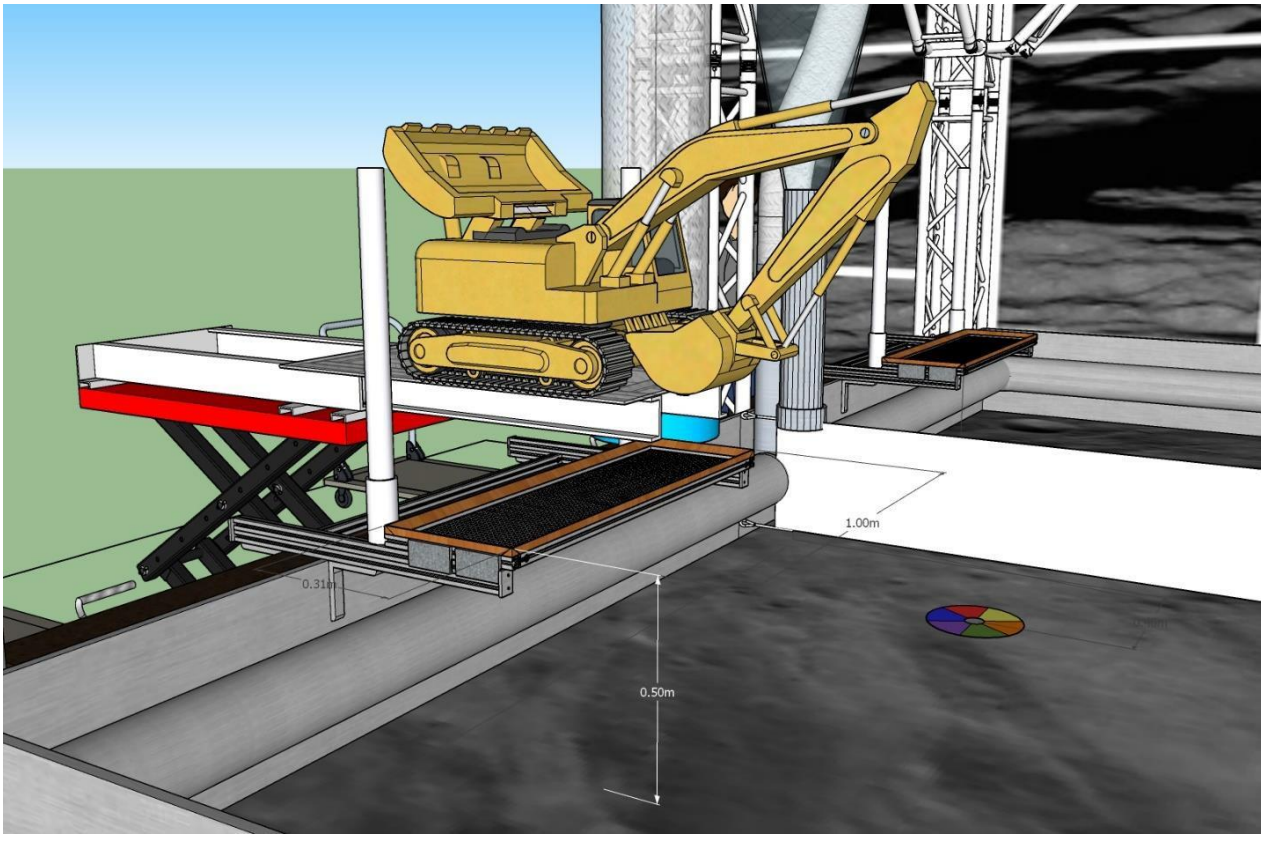
**FAQ's – Rev 02 - 09.10.2021**

5Q: I am asking a clarifying question for the competition event. Do the faculty advisors have to attend the competition?
**5A: Each team must be accompanied by an adult age 21 or older serving as the faculty advisor.**

4Q: Can the team lead submit the application form, or does it have to be the faculty advisor?
**4A: Either the Faculty Advisor or the Team Lead can register the team at:**
https://secorstrategies.submittable.com/submit/1f767a20-6fd1-4032-ab0f-441e6312d517/2022-nasa-lunabotics-team-registration

3Q: Are undergraduate students who will have graduated approximately two weeks before the competition still allowed to compete? I ask because my university's commencement is before the competition itself.
**3A: Yes. Students who have graduated in the same semester/quarter as this challenge are eligible to be on the team.**

2Q: It doesn't appear as though a dimension for the deposit location's height off the ground.
**2A: The target sieve is 1.0 meter wide by 0.31 meter deep. The top lip of the sieve, as shown, is 0.5 meter off the surface of the regolith.**



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**FAQ's – Rev 01 - 08.31.2021**

1Q: I am emailing to ask if all participating students need to be US citizen for LUNABOTICS competition?
**1A: No, they do not need to be U.S. citizens.**

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**CHANGE 01- 09.24.2021**

Attention All Teams:
Registration closed on September 22, 2021 and your response to this Artemis Student Challenge has been magnificent. While NASA is still only able to accommodate 50 teams for the on-site mining portion of the competition, we have decided to allow all registered teams an equal opportunity to participate on site regardless of when they registered. This year the Project Management Plan will serve as the first gateway to the competition. Our panel of judges will evaluate the Project Management Plans from all currently registered teams and down-select to fill the 50 competition slots and 10 waitlist slots based on those submissions.

A good Project Management Plan (PMP) is critical to the success of any project. For LUNABOTICS 2022 the PMP is your key to the competition and it is due quite soon. To maximize your chances of coming on site for this year's competition be sure to read carefully and fully comply with the PMP Rubric in the LUNABOTICS Guidebook. A read of the Systems Engineering Paper Rubric may also provide some insights for developing your PMP.

LUNABOTICS has provided eleven short instructional videos on Systems Engineering (https://www.nasa.gov/content/systems-engineering-for-university-level-engineering-projects-and-competitions ), each of which describes some important concepts that will help in the development of your PMP. Good luck, and be sure to submit your PMP by the due date and time.

Teams that are waitlisted must notify us if they wish to remain in the competition, submit deliverables as required and respond to correspondence as needed.

**In addition, Guidebook Section 4.3 is removed in its entirety and replaced with Section 4.3 (Rev 1) below:**

## 4.3 (REV 1) - DESIGN IT, BUILD IT, DIG IT CHALLENGE (PHASE I, PHASE II, PHASE III)

1. **In Phase I Design It, teams will submit:**
    a. The Project Management Plan.

    The 50 highest scoring Plans will advance to Phase II. The remaining teams will be waitlisted.

2. **In Phase II Build It, teams will submit:**
    a. Systems Engineering Paper
    b. Public Outreach Project Report
    c. Presentation and Demonstration **(optional)**
    d. Student Resume **(optional)**
    e. Robot Photo with School Name – (JPEG, front, side and back of the robot).
    f. Proof of Life on YouTube link – this is a video of your robot performing two mining cycles or 5 minutes of continuous operations
    g. Your Robot Data - Provide information about your robot in Google Docs

at: https://docs.google.com/forms/d/e/1FAIpQLSeB3v9iz1LoqPW2y1vLgLNlPGS_W9Lt6nSRqU9jE3015Cq3C1A/viewform?usp=sf_linikk

h. Team Roster - Corrections to NASA generated Team Roster.
i. Team Roster - Final for clearance by security. No changes after the posted date.
j. Media Release Forms.
k. Team Photo w/ faculty **(Virtual Photo)**

Teams successfully completing all Phase II "Build It" requirements will be invited to the Phase III "Dig It" on-site challenge at the Kennedy Space Center in Florida (at the present time LUNABOTICS is not authorized to have an on-site competition. In the event there are any changes, the team will be notified by email and the message will be posted on the LUNABOTICS website).

Remember all deliverables are required unless otherwise stated, teams failing to meet the deadlines will be removed from the competition. Submit all items through the website links. Email submissions or copies are no longer acceptable. Do not wait until the deadline to submit. The Lead Judge's Decision is Final on this and all competition items.

If you have questions, now's the time, tomorrow is too late. Communicate – Communicate – Communicate. We realize that we are living in interesting times with the hope that this change benefits all schools.

Good Luck!
From the NASA LUNABOTICS Team

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**CLARIFICATION 02 - 09.24.2021**

Refer to Guidebook Section 3.2, FAQ 1 and FAQ 9.
It is up to the Faculty Advisor to decide the composition of their team IAW the Guidebook. To attend onsite testing activities, participants must be U.S. Citizens. Any changes to this policy statement this will be published here, in the FAQ's. However, anyone can go to the Kennedy Space Center Visitor Complex and, with a paid admission, view the event as a spectator (https://www.kennedyspacecenter.com/).

**CLARIFICATION 01 - 08.31.2021**

In Section II, Competition Deadlines lists the registration period date(s) and time. Section 3.3 Registration states the competition is limited to the first 50 teams. The registration website will open at the date and time as stated. The website will close when 50 teams have completed registration or at the date and time as stated, whichever comes first. The registration website will be open only during the period listed in Section II, Competition Deadlines. Register your team at: https://secorstrategies.submittable.com/submit/1f767a20-6fd1-4032-ab0f-441e6312d517/2022-nasa-lunabotics-team-registration

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**~ end of FAQ's ~**